REMARKS

The present amendment is in response to the office action dated November 13, 2006, where claims 1-21 were rejected under 35 USC 103(a).

The claims have been amended. No new matter has been added.

In particular, Applicant responds to the detailed action and respectfully requests that all claims detailed in the application be placed in a state of allowance.

A. Prior Art Rejections (35 U.S.C. §103)

The office action has rejected claims 1-21 under 35 U.S.C. §103 as being anticipated by U.S. Patent 6,465,888 to Chooi et al. (hereinafter "Chooi '888") in view of U.S. Patent Application 2002/0081854 to Morrow et al. (hereinafter "Morrow").

The present action states that Chooi teaches all the limitations found in the claims, except that the reference does not teach removing the photoresist film from the surface of the structure by using carbon monoxide gas. However, Morrow is described as teaching "removing the photoresist film by using carbon monoxide gas (CO) from the surface of the structure (see figures 5e, paragraph #54). The office action notes that "the same gas would inherently provide the same function as minimizing the loss of the exposed barrier during the removal of the photoresist film" (office action, page 4, 6th paragraph). The office action further notes that it would be obvious to one of skill to remove the photoresist film by using carbon monoxide gas from the surface of the structure as taught by Morrow because removing the photoresist film by using mixture of CO, O, and N gas from the surface of the structure would prevent attach or damage to the bottom layer or the side wall of the structure. Applicant respectfully disagrees.

The Chooi Reference

Chooi teaches removing the first photoresist layer preferably by oxygen plasma ashing (see Chooi, Figure 2b, col. 8, lines 11-16). The etching chemistry used before the removal of the first photoresist layer includes one or more of the following: fluorocarbon, such as CF4 , C4F8, hydrocarbons, fluorine-substituted hydrocarbons, fluorosulfur, chlorine, hydrogen bromide, oxygen, nitrogen, argon and carbon monoxide (see Chooi, col. 8, lines 3-7). In other words, during the removal of the photoresist layer by ashing, the oxidizing gas mixture reacts with the fluorinated polymer and produces a gas mixture that etches the barrier. However, in Applicant's newly amended claims, the method of removing a photoresist layer includes using an oxidizing gas mixture to remove the organic photoresist. As explained in Applicant's specification, the oxidizing gas mixture reacts with the fluorinated polymer to produce a gas mixture that etches the barrier (see Applicant's specification, paragraph 11).

Furthermore, in Chooi, a gas mixture comprising oxygen, nitrogen, carbon monoxide and other gases is used as an etchant (see Chooi, col. 8, lines 17-33). Although this gas mixture includes oxygen, nitrogen and carbon monoxide, as a result of other gases such as fluorocarbons, fluorine and the like, this gas mixture works as an etchant which etches the dielectric layer, while the process of photoresist layer removal needs to remove the photoresist layer and minimize the loss of the exposed barrier layer. Therefore, the same gases, i.e., oxygen, nitrogen and carbon monoxide, play markedly different roles due to their specific work environment. In the etching process, certain properties of oxygen, nitrogen and carbon monoxide are used to help perform etching. During the photoresist removal, the carbon monoxide (CO) scavenges fluorine from polymerized fluorine ($C_xH_yF_z$) deposited on the IC and/or the reactor. Then the oxidizing

gas having carbon monoxide (CO) removes the photoresist layer with little or no etching of the exposed barrier layer.

Therefore, Chooi does not teach nor suggest all the newly amended features of claims 1-21. In fact, Chooi does not describe or suggest the elements of the claims, either separately or in combination, namely, the use of an oxidizing gas mixture comprising carbon monoxide (CO) to remove the photoresist when the dielectric has been previously etched to expose the barrier layer.

The Morrow Reference

Morrow is described as teaching the removal of the photoresist film by using a mixture of carbon monoxide gas (CO), oxygen and nitrogen gas from the surface of the structure. In fact, if a plasma formed from a mixture of carbon monoxide gas (CO), oxygen and nitrogen gas is used to perform the etching step, the photoresist layer 530 may be removed at the same time via 540 is etched through layer 556 (see Morrow, figure 5e paragraph #54).

Thus, the plasma formed from the mixture of carbon monoxide gas (CO), oxygen and nitrogen gas is mainly used in an etching/patterning process rather than a removing/stripping photoresist process. Moreover, the etch plasma depends on a special structure that its dielectric layer comprises oxide base layer, which is covered by polymer based film (see Morrow, paragraph #46). And in other structures, a preferred plasma that may be used to perform such an etch step may result from feeding a mixture of C_4F_8, oxygen and argon into a conventional plasma etcher (see Morrow, paragraph #25). In other words, the plasma formed from the mixture of carbon monoxide gas (CO), oxygen

and nitrogen gas is mainly used in an etching/patterning process and is highly selective to the dielectric layer.

As explained above, Chooi does not describe or suggest the elements of the claims, either separately or in combination, namely, the use of an oxidizing gas mixture comprising carbon monoxide (CO) to remove the photoresist when the dielectric has been previously etched to expose the barrier layer. Morrow uses the plasma formed from the mixture of carbon monoxide gas (CO), oxygen and nitrogen gas as etching/patterning chemistry which is highly selective to its dielectric layer. These two methods use specific etchants including different chemistry for photoresist removal, and there is no suggestion in the references which indicates how and why such distinct processes can be combined. In other words, neither Chooi nor Morrow suggests how one skilled in the art of IC fabrication would have achieve using carbon monoxide (CO), a reducing agent, in an oxidizing gas mixture to remove the photoresist.

Therefore, Applicant respectfully submits that independent claims 1, 9, 15, 20 and 21, are not taught nor suggested by Chooi in view of Morrow.

Since the independent claims 1, 9, 15, 20 and 21 overcome the 35 USC §103 rejection, Applicant requests that the remaining dependent claims also overcome the obviousness rejection by way of their dependencies.

Conclusion

For all the foregoing reasons, allowance of claims 1-21 pending in the present application is respectfully requested.

Respectfully Submitted,

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